What is claimed is:

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1. A gas discharge laser, comprising:

a housing;

an upper electrode;

a lower electrode;

a lower electrode support;

a first cross-flow blower section, comprising a plurality of radial blades, further comprising a plurality of internal hubs and two end hubs, said hubs describing a cylindrical circumference extending along the axis of the blower;

a second cross-flow blower section, comprising a plurality of radial blades, further comprising a plurality of internal hubs and two end hubs, said hubs describing the same cylindrical circumference as the hubs of the first cross-blower section and extending to and along the axis of the second cross-flow blower; a flange comprising two ends, the first end coupling to the shafts of the first and second blowers, the second end coupling to the housing;

said flange also comprising two edges, a leading edge and a trailing edge, wherein the leading edge couples to the housing at a leading edge point, and wherein the trailing edge couples to the housing at a trailing edge point, and where the leading edge point and trailing edge point describe an arc coaxial to said cylindrical circumference, said arc having an arc angle in the range of 50° to 10°.

2. A gas discharge laser, comprising:

a housing;

an upper electrode;

a lower electrode;

a lower electrode support;

a first cross-flow blower section, comprising a plurality of radial blades, further comprising a plurality of internal hubs and two end hubs, said hubs describing a cylindrical circumference extending along the axis of the blower;

a second cross-flow blower section, comprising a plurality of radial blades, further comprising a plurality of internal hubs and two end hubs, said hubs describing the same cylindrical circumference as the hubs of the first cross-blower section and extending to and along the axis of the second cross-flow blower;

a flange comprising two ends, the first end coupling to the lower electrode support, the second end coupling to the housing;

said flange also comprising two edges, a leading edge and a trailing edge, wherein the leading edge couples to the housing at a leading edge point, and wherein the trailing edge couples to the housing at a trailing edge point, and where the leading edge point and trailing edge point describe an arc coaxial to said cylindrical circumference, said arc having an arc angle in the range of 50° to 10°.

3. The gas discharge laser of any of claims 1 or 2, wherein the flange cross-section has an aerodynamic shape with respect to a direction of the flow of laser gas.

4. The gas discharge laser of any of claims 1 or 2, wherein each of the radial blades comprises a top surface having a first radius of curvature and a bottom surface having a second radius of curvature, wherein the first radius of curvature is smaller than the second radius of curvature.

5. The gas discharge laser including the first and second cross-flow blower sections of any of claims 1 or 2, wherein each radial blade has a cross-section shaped like an airfoil.

6. The gas discharge laser fo Claim 5, wherein inner and outer surfaces of said blades have different radii of curvature

7. The gas discharge laser of Claim 5, wherein said blades have an extruded profile.

8. The gas discharge laser of any of claims 1 or 2, wherein the flange cross-section has an aerodynamic shape with respect to a direction of the flow of laser gas, wherein each radial blade has a cross-section shaped like an airfoil, wherein the second end of the flange is coupled to the housing on a side opposite to the upper electrode.

9. The gas discharge laser including the first and second cross-flow blower sections of any of claims 1 or 2, each further comprising a plurality of internal hubs, and two end hubs, wherein the radial blades,

internal hubs and end hubs are formed from one of the group consisting of aluminum alloy, magnesium alloy, titanium alloy and steel.

10. The gas discharge laser including the first and second cross-flow blowers of any of claims 1 or 2, each further comprising a plurality of internal hubs, and two end hubs, wherein the radial blades, internal hubs and end hubs are formed from aluminum alloy.

11. The gas discharge laser including the first and second cross-flow blowers of any of claims 1 or 2, each further comprising a plurality of internal hubs, and two end hubs, wherein the radial blades, internal hubs and end hubs are formed from magnesium alloy.

12. The gas discharge laser including the first and second cross-flow blowers of any of claims 1 or 2, each further comprising a plurality of internal hubs, and two end hubs, wherein the radial blades, internal hubs and end hubs are formed from titanium alloy.

13. The gas discharge laser including the first and second cross-flow blowers of any of claims 1 or 2, each further comprising a plurality of internal hubs, and two end hubs, wherein the radial blades, internal hubs and end hubs are formed from steel.

14. A cross-flow blower for a gas discharge laser, comprising a plurality of radial blades, a plurality of internal hubs, and two end hubs,

wherein the radial blades, the internal hubs and end hubs are cast as a single piece.

15. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and end hubs are cast using a lost wax method.

16. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and end hubs are cast using a die casting method.

17. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and ends hubs are formed from a material selected from the group consisting of aluminum alloy, magnesium alloy, titanium alloy and steel.

18. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and ends hubs are formed from aluminum alloy.

19. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and ends hubs are formed from magnesium alloy.

20. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and ends hubs are formed from titanium alloy.

21. The cross-flow blower of claim 14, wherein the radial blades, internal hubs and ends hubs are formed from steel.

22. The cross-flow blower of claim 14, wherein each radial blade has a cross-section shaped like an airfoil.

23. The cross-flow blower of Claim 22, wherien said blades have inner and outer surfaces with differeing radii of curvature.

24. A cross-flow blower for a gas discharge laser, comprising a first shaft and a second shaft, wherein each of the shafts comprise an end portion, wherein each end portion having a center cross-sectional area, a first end cross-sectional area and a second end cross-sectional area, wherein the center cross-sectional area has a diameter greater than the diameter of the first end cross-sectional area, and wherein the center cross-sectional area has a diameter greater than the second end cross-sectional area.

25. The cross-flow blower of Claim 24, wherein each shaft end portion has a constant radius of curveture.

26. The cross-flow blower of Claim 24, wherein each shaft end portion has a varying radius of curveture.

27. The cross-flow blower of claim 24, wherein each of the end portions further comprise a minimum diameter $D_{min}$ and wherein $D_{max}$- $D_{min}$ is approximately .02 millimeters.

28. The cross-flow blower of claim 24, wherein each of the end portions further comprise a minimum diameter $D_{min}$ and wherein $D_{max}$- $D_{min}$ is in the range of .005 to .05 millimeters.

29. The cross-flow blower of any of claims 21, 22, 23, 24, or 25 further comprising radial blades, a plurality of internal hubs, two end hubs, wherein the radial blades, internal hubs and end hubs are cast as a single piece.

30. The cross-flow blower of Claim 29, wherein shafts and end hubs comprise different materials.

31. A gas discharge laser, comprising:

a laser tube filled with a gas mixture;

a plurality of electrodes, including a pair of main discharge electrodes, within the discharge chamber connected to a discharge circuit for energizing the gas mixture;

a optical resonator for generating a laser beam; and

a cross-flow blower assembly including a pair of longitudinally adjacent and coaxially disposed cylindrical cross-flow blowers, and a flange supportingly disposed therebetween, wherein said flange cross-sectionally overlaps said blowers by less than 50%.

32. A gas discharge laser, comprising:

a laser tube filled with a gas mixture;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture, said plurality of electrodes including a pair of main discharge electrodes spaced apart by a discharge volume;

a optical resonator for generating a laser beam; and

a cross-flow blower assembly including a pair of longitudinally adjacent and coaxially disposed cylindrical cross-flow blowers, and a flange supportingly disposed therebetween, wherein said flange is cross-sectionally non-overlapping a downstream arc of said blowers.

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33. The laser of Claim 32, wherein said downstream arc is cross-sectionally disposed between said flange and said discharge volume permitting substantial interflow between portions of the gas mixture circulated by each of said pair of blowers before said portions reach the discharge volume.

34. A gas discharge laser, comprising:

a laser tube defined by a support housing filled with a gas mixture, said support housing including an outer enclosure;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture, said plurality of electrodes including first and second main discharge electrodes spaced apart by a discharge volume, said first main electrode being supported proximate to outer enclosure, said second main electrode being supported by an electrode support bar coupled at either end with said outer enclosure;

a optical resonator for generating a laser beam; and

a cross-flow blower assembly including a pair of longitudinally adjacent and coaxially disposed cylindrical cross-flow blowers, and a flange supportingly disposed therebetween, wherein said flange is coupled to said support housing apart from said electrode support bar.

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35. The laser of Claim 34, wherein said flange is coupled to said support housing only at said outer enclosure and supportingly at said blowers.

36. A gas discharge laser, comprising:

a laser tube defined by a support housing filled with a gas mixture, said support housing including an outer enclosure;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture, said plurality of electrodes including first and second main discharge electrodes spaced apart by a discharge volume, said first main electrode being supported proximate to outer enclosure, said second main electrode being supported by an electrode support bar coupled at either end with said outer enclosure;

a optical resonator for generating a laser beam; and

a cross-flow blower assembly including a pair of longitudinally adjacent and coaxially disposed cylindrical cross-flow blowers, and a flange for coupling said blowers with said outer enclosure of said support housing apart from said electrode support bar.

37. The laser of Claim 36, wherein said flange couples said blowers to said support housing only at said outer enclosure.

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38. A gas discharge laser, comprising:

a laser tube defined by a support housing filled with a gas mixture;

a plurality of electrodes within the discharge chamber connected to a discharge circuit for energizing the gas mixture, said plurality of electrodes including first and second main discharge electrodes spaced apart by a discharge volume;

a optical resonator for generating a laser beam; and

a cross-flow blower assembly for circulating the gas mixture through said discharge volume, said cross-flow blow assembly including a shaft rotated by a motor, said shaft including a coupling segment with a longitudinally non-uniform thickness, such that when said blower vibrates in bending mode, said coupling segment rocks smoothly within a mating coupling of the support housing.

39. The laser of Claim 38, wherein said coupling segment includes a narrowed end portion around a thicker middle portion.

40. The laser of Claim 38, wherein said coupling segment is rounded.

41. The laser of Claim 38, wherein a difference in maximum and minimum thickness of said coupling segment is less than 1.0 mm

42. The laser of Claim 41, wherein said difference is more than 0.005 mm.

43. The laser of Claim 38, wherein a difference in maximum and minimum thickness of said coupling segment is between 0.005 mm and 0.05 mm.

Replacement Sheet